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TECHNICAL REPORT RD-AS-88-8

# POWER UP MODIFICATION FOR VIDEO SWITCHER MICROPROCESSOR INTERFACE FOR SENSOR SYSTEM PROCESSING SYSTEM

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This report describes the Power-up Modifcation of the Video Switch Interface of the SSPS Lab. The Video Swicher Microprocessor Interface is used to interface between the SSPS VAX 11/785 and the Video Switcher. The modifications made are (1) creating a power-up circuit that resets the microprocessor, (2) changing the chip selects from the start-up program, and (3) programming the EPROM to run the start-up program and user interface program.


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## I. INTRODUCTION

The video switcher microprocessor interface is used in support of autonomous acquisition and processors for the sensor system processing system. The original interface configuration, consisting of the Motorola 6800 and support devices, experienced numerous failures attributable to power loss, power glitches and erroneous data which required the microprocessor system to be manually rebooted after each failure. There was evident need for a circuit that automatically rebooted the microprocessor interface that was used between the SSPS VAX 11/785 and the video switcher.

## II. MODIFICATION

The reset modification for the Motorola 6800 microprocessor interface consisted of basically of three steps, (1) designing of a reset circuit, (2) changing the chip selects, and (3) modification of existing programs.

### A. Power Up Circuit

Due to the randomness of power glitches and bad data, a simple circuit was designed that would reset the microprocessor continuously with a predetermined amount of time (4 minutes) between each reset and have a manual switch that could reset the microprocessor, if desired, when a failure occurred between resets. The reset circuit consists of an astable (NE 555), a monostable (74LS123), and a manual reset switch as shown in the figure. The astable produces a 4 minute digital cycle which stays high for 2 minutes and low for 2 minutes. The output from the astable is connected to the A input (see figure) of the monostable which creates a pulse of 12 msec. The inverted output of the monostable is connected to reset on the microprocessor. The microprocessor resets on low and starts running on the rising edge of the inverted pulse.

For this circuit, the pulse generated by the monostable is created two ways, one for the automatic reset and one for the manual reset switch. In the automatic circuit, the monostable requires a falling edge on input A to send out a pulse. Therefore, the monostable will send out a pulse on the falling edge of the astable cycle. In the manual circuit, the monostable requires that input A be low and a rising edge on the clear input. When the reset switch is depressed, the astable and monostable are reset. The reset causes the astable's output to go low and stay low until the next change of state two minutes later. On the release of the switch the clear input on the monostable goes high resulting in a rising edge. Since the output from the astable is connected to input A of the monostable and clear on the monostable is rising, a pulse is sent out.

B. Chip Selects

Changing the chip selects from the microprocessor's ROM startup program to an EPROM startup program was accomplished by wiring the chip select of the ROM to the chip select of the EPROM and removing the ROM.

C. Modification of Programs

Programming the EPROM with a startup program that would initialize the microprocessor devices and run the existing user interface program was accomplished by modifying the existing startup and user program, Data Table 1, and loading both into the EPROM.

## III. DISCUSSION

The Motorola 6800 microprocessor, whenever reset, receives a restart interrupt and outputs the addresses \$FFFE and \$FFFF in order to bring in the starting address of the restart routine. Due to internal address mapping, these addresses exist in the top two locations of the JBUG ROM (\$E3FE and \$E3FF) and respond with the address \$E08D. Since the JBUG ROM is the startup ROM and will be removed, this address had to be loaded in the top addresses of the EPROM.

NOTE

The EPROM used was the MC68708.

The restart routine at \$E08D of the JBUG ROM was loaded and then a jump was inserted after the restart routine to proceed to the interface program. Subroutines used by the interface program were loaded and all addresses pointing to the old EPROM location (CXXX) had to be changed to the ROM addresses (EXXX) where the new EPROM is located. Also, some minor debugging had to be performed due to the new setup. Data Table 2 shows the EPROM user program written by Richard Sims. The modifications that were made to this user program are highlighted in bold and underlined. The EPROM startup program and other related data are shown in Data Table 1.

Further information regarding this program may be obtained by referring to the MEK6800D2 Evaluation Kit II Manual, Appendix 1.

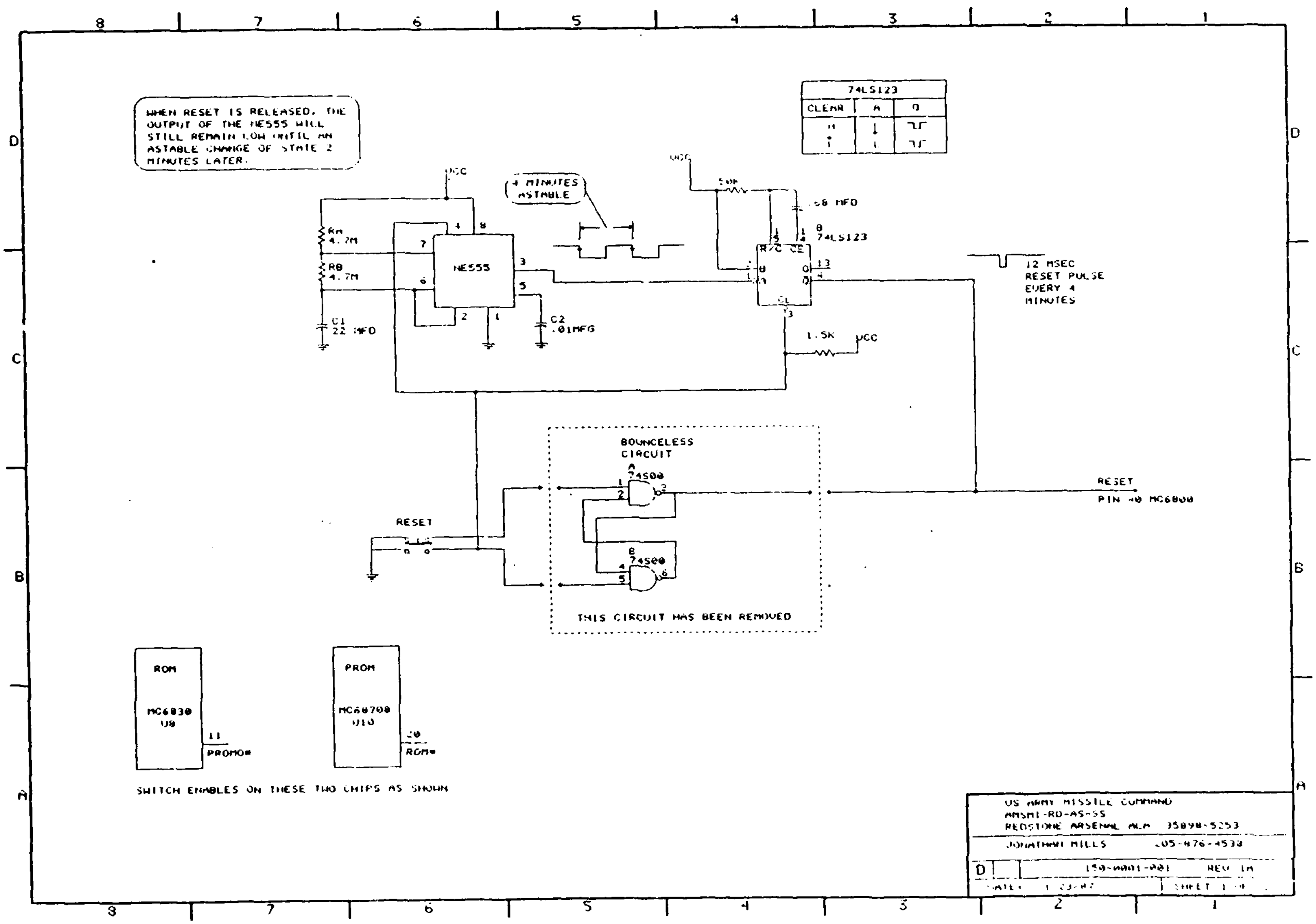


Figure. Power-up circuit.

DATA TABLE 1

| ADDRESS | DATA | COMMAND | DESCRIPTION |
|---|---|---|---|
| 084 | 86 | LDAA | |
| 085 | 3C | | |
| 086 | B7 | STAA | INTR MASKED CA1 ACTIVE LOW |
| 087 | 80 | | |
| 088 | 21 | | |
| 089 | B7 | STAA | INTR MASKED CB1 ACTIVE LOW |
| 08A | 80 | | |
| 08B | 23 | | |
| 08C | 39 | RTS | |
| 08D | 8E | LDS | |
| 08E | A0 | | |
| 08F | 78 | | |
| 090 | BF | STS | INITIALIZE STACK POINTER |
| 091 | A0 | | |
| 092 | 08 | | |
| 093 | CE | LDX | GO TO RESTART ROUTINE |
| 094 | <u>E0</u> | | |
| 095 | <u>8D</u> | | |
| 096 | FF | STX | INITIALIZE NMI INTERRUPT |
| 097 | A0 | | |
| 098 | 06 | | |
| 099 | 86 | LDAA | |
| 09A | FF | | |
| 09B | B7 | STAA | PB0-PB7 OUTPUTS |
| 09C | 80 | | |
| 09D | 22 | | |
| 09E | 44 | LSRA | |
| 09F | B7 | STAA | PA0-PA6 OUTPUTS, PA7 INPUT |
| 0A0 | 80 | | |
| 0A1 | 20 | | |
| 0A2 | 8D | BSR | DISABLE KEYBOARD/TRACE |
| 0A3 | E0 | | |
| 0A4 | 86 | LDAA | |
| 0A5 | 03 | | |
| 0A6 | B7 | STAA | RESET THE ACIA |
| 0A7 | 80 | | |
| 0A8 | 08 | | |
| 0A9 | 7F | CLR | INITIALIZE VFLAG |
| 0AA | A0 | | |
| 0AB | 1D | | |
| 0AC | 8D | BSR | CLEAR DISPLAY AND FLAGS |
| 0AD | 04 | | |
| 0AE | <u>7E</u> | JMP | GOTO USER PROGRAM |
| 0AF | <u>E0</u> | | |
| 0B0 | <u>00</u> | | |
| 0B2 | CE | LDX | |
| 0B3 | A0 | | |
| 0B4 | 14 | | |

DATA TABLE 1 (Cont'd)

| ADDRESS | DATA | COMMAND | DESCRIPTION |
|---|---|---|---|
| 0B5 | 4F | CLRA | CLEARS DIGIN4 AND DIGIN8 |
| 0B6 | A7 | STAA | CLEARS MFLAG AND RFLAG |
| 0B7 | 00 | | |
| 0B8 | 08 | INX | CLEARS NFLAG AND TEMP2 |
| 0B9 | 8C | CPX | END? |
| 0BA | A0 | | |
| 0BB | 1A | | |
| 0BC | 26 | BNE | NO LOOP BACK |
| 0BD | F8 | | |
| 0BE | CE | LDX | |
| 0BF | A0 | | |
| 0C0 | 0C | | |
| 0C1 | FF | STX | INITIALIZE XKEYBF |
| 0C2 | A0 | | |
| 0C3 | 1A | | |
| 0C4 | 86 | LDAA | |
| 0C5 | 7F | | |
| 0C6 | B7 | STAA | BLANK DISPLAY |
| 0C7 | 80 | | |
| 0C8 | 20 | | |
| 0C9 | 86 | LDAA | |
| 0CA | 11 | | |
| 0CB | CE | LDX | |
| 0CC | A0 | | |
| 0CD | 0C | | |
| 0CE | A7 | STAA | CLEAR OUT DISPLAY BUFFER |
| 0CF | 00 | | |
| 0D0 | 08 | INX | |
| 0D1 | 8C | CPX | END? |
| 0D2 | A0 | | |
| 0D3 | 14 | | |
| 0D4 | 26 | BNE | |
| 0D5 | F8 | | |
| 0D6 | 39 | RTS | |
| 0DD | CE | LDX | START OFF A DELAY PROGRAM |
| 0DE | 06 | | |
| 0DF | 00 | | |
| 0E0 | 09 | DEX | |
| 0E1 | 26 | BNE | |
| 0E2 | FD | | |
| 0E3 | 39 | RTS | |
| 3FE | E0 | | RESTART INTERRUPT VECTOR |
| 3FF | 8D | | |

DATA TABLE 2

| ADDRESS | DATA | COMMAND | DESCRIPTION |
|---|---|---|---|
| 000 | 86 | LDAA | |
| 001 | 00 | | |
| 002 | B7 | STAA | |
| 003 | 80 | | |
| 004 | 04 | | |
| 005 | 86 | LDAA | |
| 006 | 38 | | |
| 007 | B7 | STAA | |
| 008 | 80 | | |
| 009 | 05 | | |
| 00A | 86 | LDAA | |
| 00B | 03 | | |
| 00C | B7 | STAA | |
| 00D | 80 | | |
| 00E | 08 | | |
| 00F | 86 | LDAA | |
| 010 | 1D | | |
| 011 | B7 | STAA | |
| 012 | 80 | | |
| 013 | 08 | | |
| 014 | B6 | LDAA | LOAD ACIA STATUS |
| 015 | 80 | | |
| 016 | 08 | | |
| 017 | 84 | ANDA | MASK STATUS BIT |
| 018 | 01 | | |
| 019 | 27 | BEQ | GO BACK IF NO DATA |
| 01A | F9 | | |
| 01B | 86 | LDAA | |
| 01C | FF | | |
| 01D | B7 | STAA | SET PRA TO ALL OUTPUTS |
| 01E | 80 | | |
| 01F | 04 | | |
| 020 | B7 | STAA | SET PRB TO ALL OUTPUTS |
| 021 | 80 | | |
| 022 | 06 | | |
| 023 | 86 | LDAA | CA2 STILL HIGH |
| 024 | 3C | | |
| 025 | B7 | STAA | CRA NOW LOOKING AT PRA |
| 026 | 80 | | |
| 027 | 05 | | |
| 028 | 86 | LDAA | CRB DOES NOT COUNT |
| 029 | 04 | | |
| 02A | B7 | STAA | CRB NOW LOOKING AT PRB |
| 02B | 80 | | |
| 02C | 07 | | |
| 02D | B6 | LDAA | ACIA DATA REGISTER |
| 02E | 80 | | |
| 02F | 09 | | |

DATA TABLE 2 (Cont'd)

| ADDRESS | DATA | COMMAND | DESCRIPTION |
|---|---|---|---|
| 030 | B7 | STAA | PUT DATA ON PRA |
| 031 | 80 | | |
| 032 | 04 | | |
| 033 | B6 | LDAA | LOAD ACIA STATUS |
| 034 | 80 | | |
| 035 | 08 | | |
| 036 | 84 | ANDA | CHECK DATA |
| 037 | 01 | | |
| 038 | 27 | BEQ | |
| 039 | F9 | | |
| 03A | B6 | LDAA | ACIA DATA REGISTER |
| 03B | 80 | | |
| 03C | 09 | | |
| 03D | B7 | STAA | PUT DATA ON PRB |
| 03E | 80 | | |
| 03F | 06 | | |
| 040 | 86 | LDAA | |
| 041 | 30 | | |
| 042 | B7 | STAA | CA2 LOW STROBE |
| 043 | 80 | | |
| 044 | 05 | | |
| 045 | CE | LDX | |
| 046 | 06 | | |
| 047 | 00 | | |
| 048 | **BD** | **JSR** | JUMP TO DELAY SUBROUTINE |
| 049 | E0 | | |
| 04A | E0 | | |
| 04B | 86 | LDAA | |
| 04C | 38 | | |
| 04D | B7 | STAA | |
| 04E | 80 | | |
| 04F | 05 | | |
| 050 | 86 | LDAA | |
| 051 | 00 | | |
| 052 | B7 | STAA | |
| 053 | 80 | | |
| 054 | 04 | | |
| 055 | 7E | JMP | GO BACK AND LOOK FOR MORE DATA |
| 056 | **E0** | | |
| 057 | 14 | | |

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